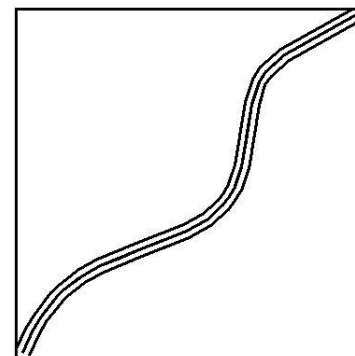


SC-2 CHECK DAM

Refer to: ITD Standards and Specifications for Highway Construction, Section 212.

ITD Standard Drawing P-1-D & P-2-B.

QPL Category: 212 Sediment Retention Fiber Rolls



Standard Symbol

Definition and Purpose

Check dams are small devices constructed of rock, sediment retention fiber rolls, gravel bags, sandbags, or other proprietary product placed across a natural or manmade channel or drainage ditch. A properly designed, constructed, and maintained check dam will reduce scour and channel erosion by reducing flow velocity and encouraging sediment settlement.

Check dams in conjunction with sediment basins are usually able to capture a large percentage of the sediments suspended in the water.

Appropriate Applications

A check dam either filters the water for sediment as it passes through the dam or retains the water, allowing the sediment to settle while the water flows over the dam. Check dams may be installed:

- In small open channels.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.

There are limited products or technologies available to construct an effective temporary check dam or channel liners, with the following practices being used:

- *Rock Check Dams* are constructed primarily of riprap and are more effective in ditches with gradients of 3H:1V or steeper, where the velocity of runoff is expected to be high, or in situations where the surface area exceeds 5 acres and drainage is funneled into a ditch or channel. An erosion control geotextile should be used in combination with rock check dams at the bottom or base of the rock check dam to prevent undercutting. In some

BMP Objectives

- | | |
|-------------------------------------|-----------------------|
| <input type="checkbox"/> | Perimeter Control |
| <input type="checkbox"/> | Slope Protection |
| <input type="checkbox"/> | Borrow and Stockpiles |
| <input checked="" type="checkbox"/> | Drainage Areas |
| <input checked="" type="checkbox"/> | Sediment Trapping |
| <input type="checkbox"/> | Stream Protection |
| <input checked="" type="checkbox"/> | Temporary Stabilizing |
| <input type="checkbox"/> | Permanent Stabilizing |

instances, erosion control geotextile should also be installed on the overflow portion of the dam to prevent erosion.

- *Sediment Retention Fiber Roll (see SC-8) Check Dams* are tubes containing straw, coconut fiber (coir), wood fiber (excelsior) mulch, or compost. The natural or organic material is wrapped in biodegradable netting. Fiber wattles, a type of sediment retention fiber roll, can be cut to length and used for ditch or channel protection and are easily installed. A series of stair steps made of wattles is effective in filtering and collecting water. Fiber wattles are degradable and can be left in place after construction.
- *Sandbag Check Dams* are suited for emergencies such as floods or slides where water needs to be diverted or channeled.
- *Straw Bale Check Dams* should only be used in emergencies and are better suited as a temporary berm or dike to capture or direct runoff where structural strength is not required. Straw bales do not filter sediment from runoff, but if installed properly, they can perform in the same manner as rock check dams.

Limitations

- Temporary check dams should be removed after the purpose is served, unless directed otherwise, or when permanent BMPs are in place and final stabilization is achieved.
- Check dams shall:
 - Not be used in live streams, except as allowed with proper approval and permitting.
 - Not be placed in channels that are already grass-lined unless erosion is expected, as installation may damage vegetation.
 - Require extensive maintenance following high velocity flows.
 - Promote sediment trapping, which can be re-suspended during subsequent storms or removal of the check dam if not properly maintained.
 - Not be constructed from silt fence.
 - Be constructed of straw bales only in emergencies.
- Poor installation and maintenance are often the cause of ineffective or poor results using check dams and channel liners.
 - Fiber wattles are ineffective on steep gradients of 1.5H:1V or steeper or in areas with high runoff.
 - Rock check dams are usually the most effective check dams to use, but the correct rock size and combination must be available and installed properly. Rock size should vary from 1 inch to 8 inches, with 8 inches making up 30 percent or more of the mix.
 - Channel liners are not suitable when used in ditches or channels with steep sides or where the soils are gravelly or not compacted, because the soil may not hold the liner in place.

Design Parameters

- Check dams shall be placed at a distance and height to allow small pools to form behind them. The check dams shall be installed approximately 6 feet from the outfall device and at regular intervals based on slope gradient and soil type.
- For installation of multiple check dams, backwater from downstream check dam shall reach the toe of the upstream dam.
- High flows shall safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams shall be removed when grass has matured sufficiently to protect the ditch or swale.
- Rock shall be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Sediment retention fiber rolls may be used as check dams if approved by the Engineer. Fiber rolls are discussed in SC-8.
- Stable inlets and outlets shall be designed and constructed prior to installation of check dams.
- When designing check dams in ditches or channels, the following factors shall be considered:
 - *Drainage area, gradient, and velocity:* When deciding which application to install, the size of the area to be drained, the gradient or slope of the ditch, and anticipated high velocity runoff must all be considered.
 - *Spacing:* Check dams should be spaced so that the toe of the upstream check dam is never lower than the top of the overflow of the next downstream check dam.
 - *Height:* The center of the check dam should be 6 to 10 inches lower than the top of the outside edge to form a weir for the overflow. The top of the outside edges should be at least 6 inches lower than the roadway, banks, or back slope to prevent water from flowing onto the roadway or undercutting the banks.
 - *Anchoring and stabilization:* Undercutting shall always be considered, regardless of the type of check dam being used. For the installation of sediment retention fiber rolls, a trench of 3 to 5 inches deep shall be dug to lay the roll in. Excavated soil shall be placed on the upstream side of the wattle and compact. The fiber wattles shall be anchored with wood stakes according to manufacturer's recommendations to properly secure the wattles in the trench.
- If straw bales are used, the bales shall be placed in a trench backfilled on the upstream side and compacted. Rock 1 to 3 inches shall be placed in the overflow area both upstream and downstream (similar to a rock check dam) to provide additional stability and strength. An overflow shall be formed in the center of straw bale check dams.

- Careful inspection is important during installation of check dams and channel liners. Refer to special contract provisions or plans to ensure that check dams and liners are installed and perform properly during their lifetime.
- Sediment trap basins shall be constructed upstream of the check dams to increase the effectiveness of sediment capture.
- **Rock Check Dams:** May be placed on erosion control geotextile to avoid undercutting. The sides shall also be lower than the adjoining banks, roadway, or backslope. Lining the upstream side of the check dam slope and overflow with a geosynthetic material is highly recommended.
- **Straw Bales:** Straw bales shall be used as ditch checks only in case of emergencies, or as temporary dikes or berms to direct the flow of water. If straw bales are used, refer to design parameters.
- **Sandbags:** All bags shall be inspected to ensure a proper seal. Place the bags in an interlocking pattern to assure proper sealing and stability.
- **Channel liners** shall be installed on side slopes of 3H:1V or flatter and in channels with a low-flow velocity. The material (geosynthetic or jute matting) should be porous, long lasting (longer than one year) and flexible.
- **Channel Lining:** Manufacturer's installation recommendations shall be followed and, in particular, include:
 - *Site preparation:* Shape, grade, and compact the bottom and banks as required for a smooth fit. Remove rocks, clods, sticks, and other materials that prevent positive contact with the soil surface. Completing contact of channel liner with the soil surface is critical for satisfactory performance.
 - *Side ditches or channels:* Treat in the same manner as the main ditch or channel.
 - *Channel liner application:* Start at the upstream end of the channel and continue down grade.
 - *Channel liner overlap:* At least 3 feet with the end of the upstream liner overlapping the top of the next lower liner. The top end of the lower liner shall be buried at least 6 inches. Both the top and bottom liner shall be securely anchored in the area of the overlap. The outer edges of the channel liner shall be buried in a trench at least 12 inches and properly anchored.
- Field adjustments shall be made as necessary to ensure proper performance.

Qualified Products List Criteria

See SC-8 (Fiber Rolls).

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications.
- Make any repairs necessary to keep the check dams in good working order and check for signs of undercutting.

- Remove accumulated debris and sediments from behind the check dams when sediment reaches a depth of one-half the original height of the dam and prior to permanent seeding or soil stabilization. Dispose of all materials properly at an approved site.
- On sediment retention fiber rolls, clean out accumulated sediment or replace the roll as necessary.
- Replace rock as necessary to maintain the correct height of rock check dams.
- Replace sandbag dam fabric as necessary.
- After channel lining is installed, make sure all liner is in contact with the soil in all places and that critical areas are securely anchored.
- Remove check dam when no longer needed or when directed by the Engineer.